

## IX. Posted Streams And Reservoirs

It is the responsibility of the Division of Water Pollution Control to post warning signs on streams or reservoirs that pose a threat to public health. In Tennessee, the most common reasons for a river or reservoir to be posted are the presence of bacteria, organic pesticides, or mercury in the water, sediment, or fish. Currently there are 62 streams, rivers, and reservoirs in Tennessee that have been posted due to pollution.

*The Commissioner shall have the power, duty, and responsibility to...post or cause to be posted such signs as required to give notice to the public of the potential or actual dangers of specific uses of such waters.*

Tennessee Water Quality Control Act

Tables 9 and 10 provide a list of advisories as of December 2002. A current list of advisories is posted on the Department's home page.

Consistent with EPA guidelines, any stream or reservoir in Tennessee with an advisory does not meet the recreational designated use. Clearly, if fishermen cannot safely eat the fish they catch, the waterbody is not fully supporting its recreational uses and therefore meets the functional definition of pollution. Likewise

streams and lakes with high levels of bacteria are not suitable for recreational activities such as swimming or wading.



*Environmental Specialist Terry Whalen places a sign warning the public to avoid contact with the water in a tributary to Citico Creek in Chattanooga. Every time this stream was sampled, children were seen playing in the water, which had very elevated bacteria levels.*

*(Photo provided by Tammy Hutchinson, Chattanooga EAC.)*

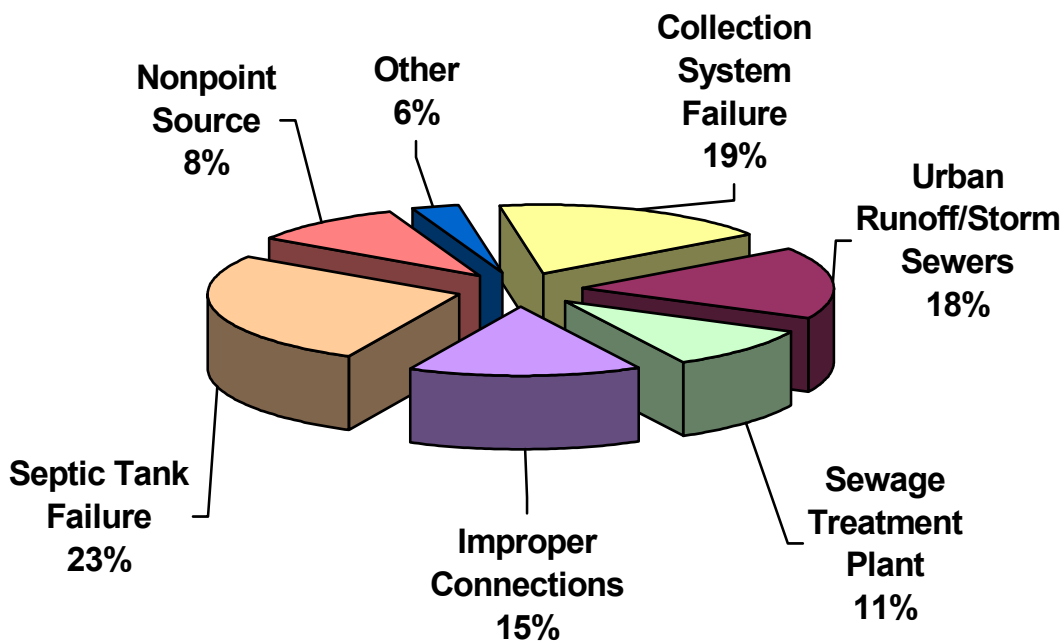
## A. Bacteriological Advisories

The presence of pathogens, disease-causing organisms, affects the public's ability to safely swim, wade, and fish in streams and reservoirs. Bacteria are the primary water borne pathogen in Tennessee. The Division's current water quality standards for bacteria are based on levels of total fecal coliforms (geometric mean of 200 colonies per 100 ml) and *E. coli* (geometric mean of 126 colonies per 100 ml). While neither of these tests is considered direct proof of human health threats, they indicate the presence of more dangerous viruses and other water-borne diseases.

Bacteria in Tennessee's streams and reservoirs affect the public's ability to safely swim, wade, and fish in streams and reservoirs.

Research is currently underway to find better indicators of risk and to differentiate between human and animal sources of bacteria. The presence of prescription medicine, caffeine, and hormones in streams has been suggested as potential markers for contamination by human waste.

Improperly treated human wastes such as septic tank or collection system failure, or improper connection to sewer or sewage treatment plants contaminate over 68 percent of the posted river miles. The remaining stream miles are posted due to bacteria levels from other sources such as failing animal waste systems or urban runoff (Figure 16). About 155 river miles are posted due to bacterial contamination (Table 9).



**Figure 16: Percent Contribution of Stream Miles Posted for Pathogen Contamination.**

(Some stream miles are posted for more than one source of pollution. Totals are not additive.)

## Table 9: Bacteriological Advisories in Tennessee

(December 2002. This list is subject to revision.

For additional information: <http://www.state.tn.us.environment/wpc/advisories>)

### East Tennessee

Stream	Portion	County	Comments
Beaver Creek (Bristol)	TN/VA line to Boone Lake (20.0 miles)	Sullivan	Nonpoint sources in Bristol and Virginia.
Cash Hollow Creek	Mile 0.0 to 1.4	Washington	Septic tank failures.
Coal Creek	STP to Clinch R. (4.7 miles)	Anderson	Lake City STP.
East Fork Poplar Creek	Mouth to Mile 15.0	Roane	Oak Ridge area.
First Creek	Mile 0.2 to 1.5	Knox	Knoxville urban runoff
Goose Creek	4.0 miles	Knox	Knoxville urban runoff.
Leadvale Creek	Douglas Lake to headwaters (1.5 miles)	Jefferson	White Pine STP.
Little Pigeon River	Mile 0.0 to 4.6	Sevier	Improper connections to storm sewers, leaking sewers, and failing septic tanks.
Pine Creek	Mile 0.0 to 10.1	Scott	Oneida STP and collection system
Litton Fork	Mile 0.0 to 1.0		
South Fork	Mile 0.0 to 0.7		
East Fork	Mile 0.0 to 0.8		
North Fork	Mile 0.0 to 2.0		
Second Creek	Mile 0.0 to 4.0	Knox	Knoxville urban runoff.
Sinking Creek	Mile 0.0 to 2.8	Washington	Agriculture & urban runoff
Sinking Creek Embayment of Fort Loudoun Reservoir	1.5 miles from head of embayment to cave	Knox	Knoxville Sinking Creek STP.
Third Creek	Mile 0.0 to 1.4, Mile 3.3	Knox	Knoxville urban runoff.

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**Table 9: Bacteriological Advisories in Tennessee**  
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**East Tennessee** (continued)

<b>Stream</b>	<b>Portion</b>	<b>County</b>	<b>Comments</b>
East Fork of Third Creek	Mile 0.0 to 0.8	Knox	Knoxville urban runoff.
Johns Creek	Downstream portion (5.0 miles)	Cocke	Failing septic tanks
Baker Creek	Entire stream (4.4 miles)	Cocke	Failing septic tanks
Turkey Creek	Mile 0.0 to 5.3	Hamblen	Morristown collection system.
West Prong of Little Pigeon River	Mile 0.0 to 17.3	Sevier	Improper connections to storm sewers, leaking sewers, and failing septic tanks.
Beech Branch	Entire stream (1.0 mile)		
King Branch	Entire stream (2.5 miles)		
Gnatty Branch	Entire stream (1.8 miles)		
Holy Branch	Entire stream (1.0 mile)		
Baskins Branch	Entire stream (1.3 miles)		
Roaring Creek	Entire stream (1.5 miles)		
Dudley Creek	Entire stream (5.7 miles)		

**Southeast Tennessee**

<b>Stream</b>	<b>Portion</b>	<b>County</b>	<b>Comments</b>
Chattanooga Creek	Mouth to GA line (7.7 mi.)	Hamilton	Chattanooga collection system.
Little Fiery Gizzard	Upstream natural area to Grundy Lake (3.7 miles).	Grundy	Failing septic tanks in Tracy City.
Clouse Hill Creek	Entire Stream (1.9 miles)		
Hedden Branch	Entire Stream (1.5 miles)		
Oostanaula Creek	Mile 28.4 -31.2 (2.8 miles)	McMinn	Athens STP and upstream dairies.
Stringers Branch	Mile 0.0 to 5.4	Hamilton	Red Bank collection system.
Citico Creek	Mouth to headwaters (7.3 miles)	Hamilton	Chattanooga urban runoff and collection system.

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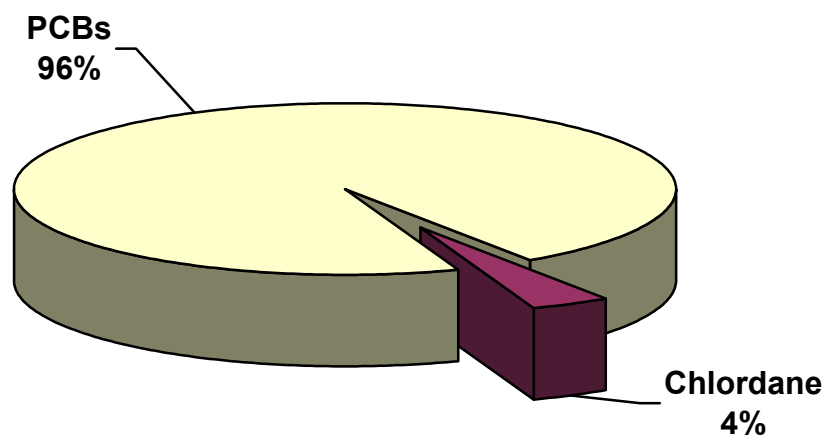
**Table 9: Bacteriological Advisories in Tennessee**  
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**Middle Tennessee**

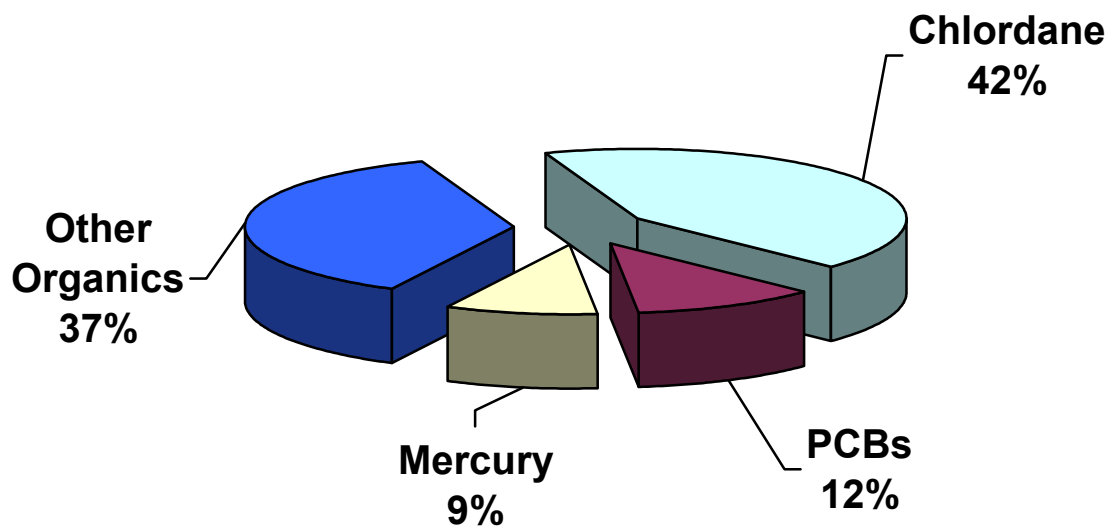
<b>Stream</b>	<b>Portion</b>	<b>County</b>	<b>Comments</b>
Baker Spring Run	Entirety (0.2 miles)	Davidson	Runoff from composting operation.
Baker Fork Creek	7.5 miles		
Duck River	Old Stone Fort State Park (0.2 miles)	Coffee	Manchester collection system.
Little Duck River	Old Stone Fort State Park (0.2 miles)		
Mine Lick Creek	Mile 15.3 to 15.8 (0.5 mile)	Putnam	Baxter STP.
Nashville Area		Davidson	Metro Nashville collection system bypassing and urban runoff.
Brown's Creek	Entirety (3.3 miles)		
Dry Creek	Mile 0.0 to 0.1		
Gibson Creek	Mile 0.0 to 0.2		
McCrory Creek	Mile 0.0 to 0.2		
Tributary to McCrory Creek	Mile 0.0 to 0.1		
Richland Creek	Mile 0.0 to 2.2		
Whites Creek	Mile 0.0 to 2.1		
Cumberland River	Bordeaux Bridge (Mile 185.7) to Woodland Street Bridge (Mile 190.6)		

**B. Fish Tissue Contamination**

Approximately 94,400 lake acres (Figure 17), and 119 river miles (Figure 18) are currently posted due to contaminated fish. The contaminants most frequently found at dangerous levels in fish tissue are organic substances like PCBs, chlordane, and other organics. The metal, mercury, has also been found at dangerously high levels in fish tissue in two east Tennessee waterways.



**Figure 17: Percent Contribution of Reservoir Acres Posted for Fish Tissue Contamination**



**Figure 18: Percent Contribution of Stream Miles Posted for Fish Tissue Contamination**

Organic substances tend to bind with the sediment in a body of water and remain there for a very long time. In the sediment, they become part of the aquatic food chain and, over time, concentrate in fish tissue. Contaminants can be found in fish tissue even if the substance has not been used or manufactured in decades. A brief synopsis of the effects of some of these specific carcinogens and/or toxic substances appears below.

- 1. PCBs.** PCBs were used in hundreds of commercial and industrial processes including electrical insulation, pigments for plastics, and plasticizers in paints. Over 1.5 billion pounds of PBCs were produced in the US prior to the ban on the manufacture and distribution of PCBs in 1976. Once PCBs enter a river or reservoir they tend to bind with sediment particles. Over time, PCBs enter the food chain and is concentrated in fish tissue. When people eat these contaminated fish, PCBs are stored in liver, fat tissue, and even excreted in breast milk. EPA has determined that PCBs are a probable human carcinogen (cancer causing agent). Additionally, in high enough concentrations, PCBs are likely to damage the stomach, liver, thyroid gland and kidneys and cause a severe skin disorder called chloracne.
- 2. Chlordane.** Chlordane is a pesticide which was used on crops, lawns, and for fumigation from 1948 to 1978 when EPA banned all above ground use. For the next decade, termite control was the only approved usage of chlordane. In 1988, all use of chlordane in the US was banned. Like PCBs, chlordane bioconcentrates in the food chain and is commonly detected in fish throughout Tennessee. In people, chlordane is stored in the liver and fat tissue. EPA has determined that chlordane is a probable carcinogen. Other possible effects to people are damage to the liver, plus nervous and digestive system disorders.
- 3. Dioxins.** Dioxins are the unintentional by-product of certain industrial processes and the combustion of chlorine-based chemicals. Dioxin refers to a class of compounds with a similar structure and toxic action. Most of these chemicals are produced from the incineration of chlorinated waste, the historical production of herbicides, the production of PVC plastics, and the bleaching possess historically used by papermills. Like many other organic contaminants, dioxins are concentrated in fish and are classified as a probable human carcinogen. Even at extraordinarily low levels (parts per quadrillion) dioxin can exert a toxic effect on larval fish. Other likely effects in people are changes in hormone levels and developmental harm to children.
- 4. Mercury.** Mercury is a persistent toxic metal used in the production of batteries, thermostats, thermometers, cameras, and many other commercial products. It is thought that the primary man-induced source of mercury in the environment is the burning of coal. Mercury is also concentrated through the food chain in fish and is a potent neurological toxicant. Additionally, EPA has determined that mercury is a probable human carcinogen. Some of the other dangers mercury poses to people are damage to stomach, brain and kidneys, and harm to unborn children.

Fish are an important part of a balanced diet and a good source of low fat protein. They also provide essential fatty acids that are crucial for the proper functioning of the nervous system and help prevent heart disease. The Department recommends that residents and visitors continue to eat fish from rivers and reservoirs, but they should also follow the published advise on consumption hazards in individual reservoirs.

When fish have levels of a contaminant that pose a higher than acceptable risk to the public, the waterbody is posted and the public is advised of the danger (Table 10). Signs are placed at main public access points and a press release is submitted to local newspapers. If needed, TWRA can enforce a fishing ban.

The list of advisories is published in TWRA's annual fishing regulations. Current advisories are also posted on TDEC's website at:

<http://www.state.tn.us.environment/wpc/advisories>



*One of the original signs posted in 1989 warning the public about dioxin in the Pigeon River in east Tennessee. The advisory was later downgraded to precautionary status in 1996, and then completely lifted in 2003. Dioxin levels in recent years have been very low. (Photo by Greg Denton, Planning and Standards.)*



## Reducing Risks From Contaminated Fish

The best way to protect yourself and your family from eating contaminated fish is by following the advice provided by the Department of Environment and Conservation. Cancer risk is accumulated over a lifetime of exposure to a carcinogen (cancer-causing agent). For that reason eating an occasional fish, even from an area with a fishing advisory, will not measurably increase your cancer risk.

At greatest risk are people who eat contaminated fish for years, such as recreational or subsistence fishermen. Some groups of people like children or people with a previous occupational exposure to a contaminant are more sensitive to that pollutant. Studies have shown that contaminants can cross the placental barrier in pregnant women to enter the baby's body, thereby increasing the risk of developmental problems. These substances are also concentrated in breast milk.

The Division's goal in issuing fishing advisories is to provide the information necessary for people to make **informed choices** about their health. People concerned about their health will likely choose not to eat fish from contaminated sites.

If you choose to eat fish in areas with elevated contaminant levels, here is some advice on how to reduce this risk:

1. **Throw back the big ones.** Smaller fish generally have lower concentrations of contaminants.
2. **Avoid fatty fish.** Organic carcinogens such as DDT, PCBs, and dioxin accumulate in fatty tissue. In contrast however, mercury tends to accumulate in muscle tissue. Large carp and catfish tend to have more fat than gamefish. Moreover, the feeding habits of carp, sucker, buffalo, and catfish tend to expose them to the sediments, where contaminants are concentrated.
3. **Wash fish before cleaning.** Some contaminants are concentrated in the mucus, so fish should be washed before they are skinned and filleted.
4. **Broil or grill your fish.** These cooking techniques allow the fat to drip away. Frying seals the fat and contaminants into the food.
5. **Throw away the fat if the pollutant is PCBs, dioxin, chlordane or other organic contaminants.** Organic pesticides tend to accumulate in fat tissue, so cleaning the fish so the fat is discarded will provide some protection from these contaminants.
6. **If the pollutant is mercury do not eat the fish.** Fish from the North Fork Holston and East Fork Poplar Creek are likely to be contaminated with mercury, which is concentrated in the muscle tissue. Therefore, the best choice is to totally avoid eating this fish. It is very important that children not eat fish contaminated with mercury. Many developmental problems in children have been linked to elevated mercury levels.

**Table 10: Fish Tissue Advisories in Tennessee**

(December, 2002. This list is subject to revision.  
For additional information: <http://www.state.tn.us.environment/wpc/advisories>)

**West Tennessee**

<b>Stream</b>	<b>County</b>	<b>Portion</b>	<b>HUC Code</b>	<b>Pollutant</b>	<b>Comments</b>
Loosahatchie River	Shelby	Mile 0.0 – 20.9	08010209	Chlordane, Other Organics	Do not eat the fish.
McKellar Lake	Shelby	Entirety (13 miles)	08010100	Chlordane, Other Organics	Do not eat the fish.
Mississippi River	Shelby	Mississippi stateline to just downstream of Meeham-Shelby State Park (31 miles)	08010100	Chlordane, Other Organics	Do not eat the fish. Commercial fishing prohibited by TWRA.
Nonconnah Creek	Shelby	Mile 0.0 to 1.8	08010201	Chlordane, Other Organics	Do not eat the fish. Advisory ends at Horn Lake Road bridge.
Wolf River	Shelby	Mile 0.0 – 18.9	08010210	Chlordane, Other Organics	Do not eat the fish.

**Middle Tennessee**

<b>Stream</b>	<b>County</b>	<b>Portion</b>	<b>HUC Code</b>	<b>Pollutant</b>	<b>Comments</b>
Woods Reservoir	Franklin	Entirety (3,908 acres)	06030003	PCBs	Catfish should not be eaten.

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**Table 10: Fish Tissue Advisories in Tennessee**  
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**East Tennessee**

<b>Stream</b>	<b>County</b>	<b>Portion</b>	<b>HUC Code</b>	<b>Pollutant</b>	<b>Comments</b>
Boone Reservoir	Sullivan, Washington	Entirety (4,400 acres)	06010102	PCBs, chlordane	Precautionary advisory for carp and catfish.*
Chattanooga Creek	Hamilton	Mouth to Georgia Stateline (11.9 miles)	06020001	PCBs, chlordane,	Fish should not be eaten. Also avoid contact with water.
East Fork of Poplar Creek including Poplar Creek embayment	Anderson, Roane	Mile 0.0 – 15.0	06010207	Mercury, PCBs	Fish should not be eaten. Also avoid contact with water.
Fort Loudoun Reservoir	Loudon, Knox, Blount	Entirety (14,600 acres)	06010201	PCBs	Commercial fishing for catfish prohibited by TWRA. No catfish or largemouth bass over two pounds should be eaten. Do not eat largemouth bass from the Little River embayment.
Melton Hill Reservoir	Knox, Anderson	Entirety (5,690 acres)	06010207	PCBs	Catfish should not be eaten.

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**Table 10: Fish Tissue Advisories in Tennessee**  
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**East Tennessee (continued)**

<b>Stream</b>	<b>County</b>	<b>Portion</b>	<b>HUC Code</b>	<b>Pollutant</b>	<b>Comments</b>
Nickajack Reservoir	Hamilton, Marion	Entirety (10,370 acres)	06020001	PCBs	Precautionary advisory for catfish.*
North Fork Holston River	Sullivan, Hawkins	Mile 0.0 - 6.2 (6.2 miles)	06010101	Mercury	Do not eat the fish. Advisory goes to TN/VA line.
Tellico Reservoir	Loudon	Entirety (16,500 acres)	06010204	PCBs	Catfish should not be eaten.
Watts Bar Reservoir	Roane, Meigs, Rhea, Loudon	Tennessee River portion (38,000 acres)	06010201	PCBs	Catfish, striped bass, & hybrid (striped bass-white bass) should not be eaten. Precautionary advisory* for whitebass, sauger, carp, smallmouth buffalo and largemouth bass.
Watts Bar Reservoir	Roane, Anderson	Clinch River arm (1,000 acres)	06010201	PCBs	Striped bass should not be eaten. Precautionary advisory for catfish and sauger.*

\*Precautionary Advisory - Children, pregnant women, and nursing mothers should not consume the fish species named. All other persons should limit consumption of the named species to one meal per month.